

ABSTRACT

5 An apparatus and method for a micro-electromechanical systems (MEMS) actuator such as a MEMS two-dimensional electrostatic comb drive having springs being advantageously configured to provide relatively large movements in first and second directions. In one embodiment, a comb drive apparatus includes a first set of comb pairs; a second set of comb pairs coupled to the first set of comb pairs; a stage coupled to the first and second sets of comb pairs; a first plurality of springs interposed between the second set of comb pairs and the stage and between the second set of comb pairs and the first set of comb pairs for movably coupling the second set of comb pairs to the stage and to the first set of comb pairs; and a second plurality of springs interposed between the first set of comb pairs and the stage and between the first set of comb pairs and the second set of comb pairs for movably coupling the first set of comb pairs to the stage and to the second set of comb pairs. In response to an appropriate electrostatic actuation force being applied to the MEMS two-dimensional electrostatic comb drive, the springs enable controlled displacement along both x-axis (horizontal direction) and y-axis (vertical direction).